AMENDMENTS TO THE CLAIMS

Claims 1-3, 5, 6, and 17-20 are amended herein. Claims 9-16 are cancelled herein. Claims 21-65 have been added. All pending claims are reproduced below.

1. (Currently Amended) A micro-switch, comprising:

~~a plurality of~~ a first substrates and a second substrate bonded together to form a ~~hermetic~~ cavity~~, the hermetic cavity sealed by at least one seal ring including at least one layer of metal~~;

on the first substrate, at least ~~two~~ one signal paths that runs from inside the cavity to outside the cavity at two locations; and

at least one movable structure on the second substrate, said movable structure comprising at least one conductive contact area, wherein at least one portion of said movable structure is inside ~~within~~ said cavity, ~~wherein~~ and the movable structure is moved in response to a force provided by an actuator, wherein a state of electrical contact of said micro-switch is changed by moving said movable structure.

2. (Currently Amended) The micro-switch of claim 1, wherein said actuator is powered through at least ~~two~~ one actuator drive line and at least one ground line, ~~signal paths is electrically connected to each other~~ wherein said at least one actuator drive line and said at least one ground line run from inside said cavity to outside said cavity, said at least one actuator drive line being electrically connected to said actuator and said at least one ground line being electrically connected to an electrical common.

3. (Currently Amended) The micro-switch of claim 1, wherein said movable structure is selected from a list of movable structures consisting of: a cantilever~~, a see-saw structure,~~ and a cantilever with ~~more than~~ at least one pedestal ~~and a membrane~~.

4. (Original) The micro-switch of claim 1, wherein said force is provided from an actuator selected from a list of actuators consisting of: electrostatic, electromagnetic, thermal, electro-thermal, and shape-memory alloy.

5. (Currently Amended) The micro-switch of claim 1, wherein the electrical contact is selected from a list of electrical contacts consisting of: metal contact, capacitive, and shunt.

6. (Currently Amended) The micro-switch of claim 1, wherein said ~~two~~ substrates first substrate and said second substrate are bonded together with a gold thermocompression bonding process.

7. (Original) The micro-switch of claim 6, wherein said gold thermocompression bonding process is performed below ~~300~~ 400 degrees C during bonding.

8. (Original) The micro-switch of claim 6, wherein said gold thermocompression bonding process is performed without heating said substrates during bonding.

9. (Canceled) The micro-switch of claim 1, wherein said seal ring is least 5 microns wide.

10. (Canceled) The micro-switch of claim 1, wherein said seal ring is at least 20 microns wide.

11. (Canceled) The micro-switch of claim 1, wherein said seal ring comprises metal layers deposited on the two substrates.

12. (Canceled) The micro-switch of claim 11, wherein metal layers of at least one substrate include gold before bonding as a surface layer.

13. (Canceled) The micro-switch of claim 11, wherein metal layers of at least one substrate include a metal with little or no surface oxide before bonding as a surface layer.

14. (Canceled) The micro-switch of claim 11, wherein metal layers of at least one substrate include a deformable metal as a surface layer before bonding.

15. (Canceled) The micro-switch of claim 14, wherein said deformable metal includes gold and at least one barrier layer.

16. (Canceled) The micro-switch of claim 1, wherein said substrates are wafers, and more than one micro-switch is formed when said two substrates are bonded.

17. (Currently Amended) The micro-switch of claim 1, wherein at least one of said first substrate and said second substrate includes at least one mechanical stop for bonding.

18. (Currently Amended) The micro-switch of claim 1, wherein said movable structure comprises at least one layer ~~is fabricated out~~ of a material selected from a list of materials consisting of: silicon, polysilicon, gold, silicon nitride, silicon oxynitride, nickel, silicon oxide and aluminum.

19. (Currently Amended) A lid assembly for a micro-switch comprising:

a substrate;

a first insulating layer formed on the substrate;

a first conductive layer formed on the substrate;

at least one ~~two~~ signal paths formed in the conductive layer;

a second insulating layer formed on the first conductive layer;

an insulating ring formed in the second insulating layer;

a second conductive layer formed on the second insulating layer;

a first conductive ring formed in the second conductive layer, the first conductive ring substantially aligned with and overlying the insulating ring;

a second substrate having a second conductive ring at least partially surrounding a movable structure, the ~~second~~ first conductive ring on

the second conductive layer substantially aligned with and overlying the ~~first~~ second conductive ring around the movable structure, thereby forming a seal around the movable structure when the lid assembly is bonded to the second substrate;

at least two external signal contact points formed in the first conductive layer, ~~each~~ said at least one signal path ~~contact point~~ electrically connected to said at least ~~one of the signal paths~~ two external signal contact points, and each contact point being outside the seal around the movable structure;

an actuator formed in the first conductive layer for providing a force on a movable structure on the second substrate; and

at least one actuator drive line ~~signal path~~ formed in the first conductive layer electrically connected to the actuator.

20. (Currently Amended) A method of making a lid assembly for a micro-switch, the method comprising:

forming a first insulating layer on a first substrate;

forming a first conductive layer on the first substrate;

forming at least one ~~two~~ signal paths in the first conductive layer;

forming at least two external signal contact points in the first conductive layer, each electrically connected to said at least one ~~of the~~ signal paths;

forming an actuator in the first conductive layer for providing a force on a movable structure on a second substrate;

forming at least one actuator drive line ~~signal path~~ in the first conductive layer electrically connected to the actuator;

forming a second insulating layer on the first conductive layer;

forming an insulating ring in the second insulating layer;

forming a second conductive layer on the second insulating layer;

forming a first conductive ring around a movable structure on a second substrate;

forming a second conductive ring in the second conductive layer, the second conductive ring in the second conductive layer substantially aligned with and

overlying the insulating ring, the second conductive ring in the second conductive layer also substantially aligned with and overlying the first conductive ring around a moving structure on the second substrate; and

bonding the first and second substrates together forming a sealed cavity and thereby sealing the movable structure, wherein the at least ~~two~~ one signal paths runs from inside the cavity to outside the cavity, and ~~each of the~~ said at least one signal paths that runs from inside to outside the cavity is connected to an external signal contact point outside the cavity.

21. (New). The lid assembly for the micro-switch of claim 19, wherein said at least one signal path formed in the conductive layer further comprises:

at least one gap separating said at least one signal path formed in the conductive layer into two electrically disconnected portions; and

in at least one state of electrical contact of said micro-switch, said movable structure electrically connecting said two electrically disconnected portions.

22. (New) The lid assembly for the micro-switch of claim 19, wherein said lid assembly includes at least one ground line that is electrically connected to an electrical common or ground.

23. (New) The lid assembly for the micro-switch of claim 19, wherein said micro-switch is a portion of a device selected from the list of portions of a device consisting of: phase shifter, power amplifier, antenna, low-noise amplifier, filter, inductor, and variable capacitor.

24. (New). The method of making a lid assembly for a micro-switch of claim 20, wherein said at least one signal path electrically connected to at least two external signal contact points further comprises:

at least one gap in said at least one signal path, separating said at least one signal path into two electrically-disconnected sections; and

in one state of electrical connection of said micro-switch, said movable structure electrically connecting said two electrically-disconnected sections.

25. (New). The method of making a lid assembly for a micro-switch of claim 20, wherein said lid assembly further comprises at least one ground line that is electrically connected to an electrical ground or common.

26. (New) The method of making a lid assembly for a micro-switch of claim 20, wherein said micro-switch is a portion of a device selected from the list of portions of a device consisting of: phase shifter, power amplifier, antenna, low-noise amplifier, filter, inductor, and variable capacitor.

27. (New) A method of making a lid assembly for a micro-switch, the method comprising:

forming a first substrate with an insulating surface;

forming a first conductive layer on said insulating surface;

forming at least two signal contact points in said first conductive layer;

forming at least one signal path in said first conductive layer;

forming an actuator in said first conductive layer for providing a force on a movable structure on a second substrate, wherein said movable structure includes at least one conductive contact area;

forming at least one actuator drive line in said first conductive layer electrically connected to said actuator;

forming at least one ground line in said first conductive layer;

forming a first insulating layer on said first conductive layer;

forming an insulating ring in said first insulating layer;

forming a second conductive layer on said first insulating layer;

forming a first conductive ring around said movable structure on said second substrate;

forming a second conductive ring in said second conductive layer, the second conductive ring in said second conductive layer substantially aligned with and overlying said insulating ring, said second conductive ring in said second conductive layer also substantially aligned with and overlying said first conductive ring around said moving structure on said second substrate; and

bonding said first substrate and said second substrate together forming a sealed cavity and thereby sealing said movable structure, wherein the at least one signal path runs from inside said cavity to outside said cavity at two locations, and said at least one signal path that runs from inside to outside said cavity is connected to said at least two signal contact points outside the cavity, said at least one actuator drive line and said at least one ground line running from inside the cavity to outside said cavity, each actuator drive line and each ground line being connected to at least one contact point outside said cavity.

28. (New). The method of making a lid assembly for a micro-switch of claim 27, wherein said at least one signal path connected to said at least two contact points further comprises:

a gap in said at least one signal path separating said at least one signal path into two electrically-disconnected portions; and

in at least one state of electrical contact, said at least one conductive contact area of said movable structure electrically connecting said two electrically-disconnected portions.

29. (New) The method of making a lid assembly for a micro-switch of claim 27, wherein said micro-switch is a part of a device selected from the list of parts of a device consisting of: phase shifter, power amplifier, antenna, low-noise amplifier, filter, inductor, and variable capacitor.

30. (New) The method of making a lid assembly for a micro-switch of claim 27, further comprising bonding said first substrate and said second substrate together with a gold thermocompression bonding process.

31. (New) The method of making a lid assembly for a micro-switch of claim 30, wherein said gold thermocompression bonding process further comprises heatless bonding of said first substrate and said second substrate.

32. (New) The micro-switch of claim 1, wherein said cavity is a hermetic cavity sealed by at least one seal ring.

33. (New) The micro-switch of claim 32, wherein said seal ring is at least 5 microns wide.

34. (New) The micro-switch of claim 32, wherein said seal ring further comprises metal layers deposited on said first substrate and said second substrate before bonding.

35. (New) The micro-switch of claim 34, wherein said metal layers include a deformable metal deposited on said first substrate and said second substrate before bonding.

36. (New) The micro-switch of claim 1, wherein said actuator is an electrostatic actuator.

37. (New) The micro-switch of claim 1, wherein said movable structure further comprises at least one layer of silicon, and at least one state of electrical contact of the micro-switch results from physical contact between said at least one conductive contact area and at least one portion of said first substrate.

38. (New) The micro-switch of claim 37, further comprising at least one insulating layer that electrically insulates one of said at least one conductive contact area from said at least one layer of silicon, wherein said at least one signal path has at least one gap separating said at least one signal path into two electrically disconnected portions, and during said at least one state of electrical contact, said at least one conductive contact area electrically connects said two electrically disconnected portions of said at least one signal path.

39. (New) The micro-switch of claim 37, wherein said at least one conductive contact area is in electrical contact with said at least one signal path on said first substrate through at least one conductive structure bonded to said first substrate.

40. (New) A micro-switch, comprising:

a first substrate with at least one signal path;
a second substrate, wherein said first substrate and said second substrate are bonded together with gold thermocompression bonding;
at least one seal ring that seals at least one hermetic cavity between said first substrate and said second substrate, wherein said at least one signal path runs from inside said hermetic cavity to outside said hermetic cavity at at least two locations, and said seal ring is comprised of gold;
at least one movable structure with at least one conductive contact area within said cavity, wherein said at least one movable structure is moved in response to a force provided by an actuator, and a state of electrical contact of the micro-switch can be changed by moving said at least one movable structure; and
means for powering said actuator.

41. (New) The micro-switch of claim 40, wherein said means for powering said actuator further comprises at least one actuator drive line and at least one ground line, wherein said at least one actuator drive line is electrically connected to said actuator and said at least one ground line is electrically connected to a common.

42. (New) The micro-switch of claim 40, further comprising:
a gap in said at least one signal path that separates said at least one signal path into two electrically-disconnected portions; and
in at least one state of electrical contact, said at least one conductive contact area of said movable structure electrically connecting said two electrically-disconnected portions.
at least one insulating layer on said movable structure, wherein said insulating layer electrically insulates said at least one conductive contact area of said movable structure from the rest of said movable structure; and
in at least one state of electrical contact of said micro-switch, said at least one conductive contact area of said movable structure electrically connects said two electrically-disconnected portions of said signal path.

43. (New) The micro-switch of claim 40, wherein said gold thermocompression bonding process further comprises heatless bonding of said first substrate and said second substrate.

44. (New) The micro-switch of claim 40, wherein said seal ring is composed of low-outgassing materials.

45. (New) The micro-switch of claim 40, wherein said seal ring is composed of low-outgassing, inorganic, non-solder materials.

46. (New) The micro-switch of claim 40, wherein the electrical contact is selected from a list of electrical contacts consisting of: metal contact, capacitive, and shunt.

47. (New) The micro-switch of claim 40, wherein at least one of said first substrate and said second substrate has at least one deformable metal layer shaped into a seal ring before said gold thermocompression bonding.

48. (New) The micro-switch of claim 40, wherein said seal ring comprises metal layers deposited on said first substrate and said second substrate before bonding.

49. (New) The micro-switch of claim 40, wherein said movable structure is fabricated on said second substrate.

50. (New) The micro-switch of claim 40, wherein said movable structure is fabricated on said first substrate.

51. (New) The micro-switch of claim 40, wherein at least one signal path runs in and out of said cavity through at least one via.

52. (New) The micro-switch of claim 40, wherein at least one signal path runs in and out of said cavity at at least one location through at least one conductive layer deposited on said

first substrate, wherein said at least one signal path is electrically isolated from at least one portion of said micro-switch with an insulating layer deposited on said first substrate.

53. (New) The micro-switch of claim 40, wherein said micro-switch is part of a device selected from the list of parts of a device consisting of: phase shifter, antenna, low-noise amplifier, power amplifier, and filter.

54. (New) The micro-switch of claim 40, wherein at least one signal path runs in and out of said cavity at at least one location through at least one conductive layer deposited on said second substrate, wherein said at least one signal path is electrically isolated from at least one portion of said micro-switch with an insulating layer deposited on said second substrate.

55. The micro-switch of claim 40, wherein said at least one movable structure further comprises at least one layer of silicon.

56. (New) A micro-switch, comprising:

a first substrate and a second substrate bonded together to form a cavity;

at least one signal path on said first substrate that run from inside said cavity to outside said cavity in at least two locations;

at least one movable structure on said second substrate within said cavity, wherein said at least one movable structure is moved in response to a force provided by an electrostatic actuator, and said at least one movable structure comprises at least one layer of silicon and at least one conductive contact area, wherein one state of electrical contact of said micro-switch results from physical contact between said at least one conductive contact area and at least one part of said first substrate; and

means for driving said electrostatic actuator.

57. (New) The micro-switch of claim 56, wherein said a least one signal path has a gap that separates said at least one signal path into two electrically-disconnected portions, and in one state of electrical contact of said micro-switch, said at least one movable structure electrically connects said two electrically disconnected portions.

58. (New) The micro-switch of claim 56, wherein said means for driving said electrostatic actuator further comprises at least one actuator drive line and at least one ground line, wherein said at least one actuator drive line is electrically connected to said actuator and said at least one ground line is electrically connected to a ground, said at least one actuator drive line and said at least one ground line running from inside said cavity to outside said cavity.

59. (New) The micro-switch of claim 56, wherein said cavity is a hermetic cavity.

60. (New) The micro-switch of claim 57, further comprising an insulating layer that electrically insulates said at least one conductive contact area of said at least one movable structure from other portions of said at least one movable structure.

61. (New) The micro-switch of claim 56, wherein said at least one conductive contact area is electrically connected with said at least one signal path through at least one conductive structure bonded to said first substrate.

62. (New) The micro-switch of claim 56, wherein said first substrate and said second substrate are bonded by gold thermocompression bonding, said cavity being hermetically sealed with at least one seal ring, and said at least one seal ring comprising at least one layer that contains gold.

63. The micro-switch of claim 56, wherein said first substrate and said second substrate are wafers.

64. The micro-switch of claim 62, wherein said gold thermocompression bonding is performed below 400 degrees C during bonding.

65. The micro-switch of claim 62, wherein said gold thermocompression bonding further comprises heatless bonding of said first substrate and said second substrate.